

WHAT IS CLAIMED:

1. A method for conveying products to a downstream conveyor,
comprising:
 - 5 providing a first conveyor having a plurality of roller shafts, each roller shaft driving at least one roller;
driving a first group of rollers shafts at a first speed;
driving a second group of roller shafts at a second speed, the second speed being less than the first speed, the second group being downstream of and
10 proximate to the first group;
driving a third group of roller shafts at substantially the second speed, the third group being downstream of and proximate to the second group; and
altering said driving of the third group relative to said driving of the second group so as to change the spacing between adjacent products being provided to the
15 downstream conveyor.
2. The method of claim 1 wherein said altering includes spacing adjacent products to a predetermined spacing.
3. The method of claim 2 wherein the predetermined spacing
corresponds to the distance between product driving lugs of the downstream
20 conveyor.
4. The method of claim 1 which further comprises providing a first driving motor for driving the first group, a second driving motor for driving the second group, and a third driving motor for driving the third group.
5. The method of claim 4 wherein the second motor is a servo motor
25 and the third motor is a servo motor.
6. The method of claim 5 wherein the first motor is a variable frequency motor.

7. The method of claim 1 wherein each roller shaft of each group drives a plurality of rollers.

8. The method of claim 1 wherein each roller shaft of the first group drives a plurality of slippable rollers.

5 9. The method of claim 8 wherein each roller shaft of the second group drives a plurality of rollers which are fixed to the corresponding shaft.

10. The method of claim 8 wherein each roller shaft of the third group drives a plurality of rollers which are fixed to the corresponding shaft.

10 11. The method of claim 1 wherein the first speed, second speed, and third speed refer to the rotational speed of the corresponding group of roller shafts.

12. The method of claim 1 wherein the first speed, second speed, and third speed refer to the conveying path speed of the at least one roller supported by the corresponding group of roller shafts.

15 13. A conveyor for conveying products along a conveying path, comprising:

a first support member extending along one side of the conveying path and parallel to the conveying path;

a second support member extending along the opposite side of the conveying path and parallel to the conveying path;

20 a first driving member supported by said first support member and extending along a first length of said first support member, said first driving member driving at least a first roller;

25 a second driving member supported by said second support member and extending along a second length of said second support member, said second driving member driving at least a second roller;

a third driving member supported by said first support member and extending along a third length of said first support member, said third driving

member driving at a third roller, wherein the second length overlaps a portion of the first length and the second length overlaps a portion of the third length;

a first means for driving said first driving member;

a second means for driving said second driving member; and

5 a third means for driving said third driving member.

14. The conveyor of claim 13 wherein said first driving member drives a plurality of slippable rollers.

15. The conveyor of claim 14 wherein said second driving member drives a plurality of fixed rollers.

10 16. The conveyor of claim 15 wherein said third driving member drives a plurality of fixed rollers.

17. The conveyor of claim 13 which further comprises an electronic controller operatively coupled to said first driving means, said second driving means, and said third driving means.

15 18. The conveyor of claim 17 wherein said controller operates said second driving member and said third driving member at substantially the same speed.

19. The conveyor of claim 17 wherein said controller alters the position of said second driving member and relative to the position of said third driving member.
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20. The conveyor of claim 13 wherein said first driving member is a first driving chain, said second driving member is a second driving chain, and said third driving member is a third driving chain.

21. The conveyor of claim 13 wherein said second driving means is a first servo motor, and said third driving means is a second servo motor.
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22. A conveyor for conveying a product comprising:

a first driving chain placed along a side of a conveying path and parallel to the conveying path, said first chain being driven in a first manner ;

5 a second driving chain placed along a side of the conveying path and parallel to the conveying path, at least a portion of the length of said second driving chain overlapping at least a portion of said first driving chain, second chain being driven in a second manner different than the first manner; and

a roller shaft having two ends and a driving wheel proximate to one end of said shaft; and

10 at lease one roller driven by said shaft, said at least one roller being adapted and configured for conveying the product;

wherein said conveyor is adapted and configured to rotatably support said roller shaft such that said driving wheel is capable of engaging said first chain and driving said roller shaft in the first manner, and said conveyor is adapted and configured to rotatably support said roller shaft such that said driving wheel is
15 capable of engaging said second chain and driving said roller shaft in the second manner.

23. The conveyor of claim 22 which further comprises an electronic controller operatively coupled to said first chain to drive said first chain in the first manner and operatively coupled to said second chain to drive said second chain in
20 the second manner, a first sensor providing a first signal corresponding to the position of said first chain, and a second sensor providing a second signal corresponding to the position of said second chain, wherein said controller receives said first signal and said second signal and adjusts the position of said first chain relative to the position of said second chain.

25 24. The conveyor of claim 22 which further comprises an infeed conveyor for receiving products from said conveyor, said infeed conveyor including a moving conveying surface and a first sensor for providing a first signal corresponding to the position of said moving conveying surface, and further

comprising a second sensor providing a second signal corresponding to the position of one of said first chain or said second chain, and further comprising an electronic controller operatively coupled to the one said chain, wherein said controller receives said first signal and said second signal and adjusts the position
5 of the one said chain relative to the position of said moving conveying surface.

25. The conveyor of claim 24 wherein said first sensor is an encoder.

26. The conveyor of claim 25 wherein said second sensor is an optical sensor.

10 27. The conveyor of claim 22 wherein the conveying path has a length, and which further comprises means for supporting said roller shaft at a location along the length, said supporting means supporting said shaft at the location when said driving wheel engages said first chain and supporting said shaft at the location when said driving wheel engages said second chain.

15 28. The conveyor of claim 22 wherein said rollers are slippable on said roller shaft.

29. The conveyor of claim 22 wherein said rollers are fixed on said roller shaft.

20 30. The conveyor of claim 22 wherein said first manner is driving by a first motor and said second manner is driving by a second motor.

31. The conveyor of claim 30 wherein the first motor is a variable frequency drive and the second motor is a servo drive.

25 32. The conveyor of claim 22 wherein said first manner is driving at a first speed and said second manner is driving at a second speed different than the first speed.

33. The conveyor of claim 32 wherein the ratio of the first speed to the second speed is a substantially constant ratio.

34. The conveyor of claim 22 wherein said first manner is driving at a first speed, and said second manner is driving at substantially the first speed and said second manner includes a plurality of drive interruptions.

5 35. The conveyor of claim 34 wherein the plurality of drive interruptions result in a plurality of positional changes of said first chain relative to said second chain.

36. The conveyor of claim 34 wherein the second manner includes a plurality of periodic drive delays.

10 37. The conveyor of claim 34 wherein the interruptions include a period of driving at a faster speed.

38. The conveyor of claim 34 wherein the interruptions include a period of driving at a slower speed.

39. The conveyor of claim 34 wherein the interruptions include a period of stoppage.

15 40. The conveyor of claim 22 wherein the first manner is independent of the second manner.

41. A conveyor for conveying a product, comprising:

20 a first section of roller shafts each driving a plurality of slippable rollers, a first portion of said first section driving rollers which slip at a first predetermined torque, a second portion of said first section driving rollers which slip at a second predetermined torque, said second torque being greater than said first torque;

a second section of roller shafts, each driving a plurality of rollers fixed to a corresponding shaft of said second section, said second section adapted and configured for receiving products conveyed from said first section; and

25 means for stopping a product on said second portion of said first section, said stopping means being proximate to said second section.

42. The conveyor of claim 41 wherein the second portion of said second section has a length that is less than about the length of the product.

43. The conveyor of claim 42 wherein the length of the second section is greater than about forty percent of the length of the product.

44. The conveyor of claim 41 which further comprises an infeed conveyor and a product wrapper, said infeed conveyor receiving conveyed products from said second section and providing the products to said product wrapper.

45. The conveyor of claim 41 wherein the conveying speed of the second section is more than about one and one-half the conveying speed of the first section.

46. A method for conveying products, comprising:
providing a slippable roller conveying section, a second conveying section, and a third conveying section;

conveying a plurality of products at a first speed by the slippable roller conveying section;

accumulating the plurality of products;

receiving the accumulated products from the slippable roller conveying section onto the second conveying section at a second speed less than the first speed;

transporting the accumulated products from the second conveying section onto the third conveying section; and

providing the accumulated products from the third conveying section in a predetermined spacing.

47. The method of claim 46 wherein the products are provided from the third conveying section in a first predetermined spacing, and which further comprises spacing the products on the second conveying section to a second predetermined pattern.

48. The method of claim 47 wherein the second predetermined pattern is for adjacent products to touch one another.

49. The method of claim 47 wherein the second predetermined pattern is for adjacent products to be separated from one another by roughly equivalent predetermined gaps.

50. The method of claim 46 wherein the second conveying section is a
5 fixed roller conveying section.

51. The method of claim 46 wherein said transporting is at substantially the second speed.

52. The method of claim 46 wherein said accumulating is at least partly on the slippable roller conveying section.

10 53. The method of claim 46 which further comprises providing a wrapping station having product spacing requirements, and the predetermined spacing is consistent with the spacing requirements.

54. The method of claim 53 which further comprises sensing a position of the wrapping station and controlling the operation of the third conveying section
15 in response to the signal.

55. The method of claim 54 wherein the wrapping station includes a belt and the sensed position is the position of the belt.